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TECHNOLOGICAL INTERVENTIONS IN VEGETABLE PRODUCTION FOR RURAL LIVELIHOOD MANAGEMENT IN THE MID CENTRAL TABLE LAND ZONE OF ODISHA

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ABSTRACT

This paper summarizes the results of a study conducted to assess the status of rural livelihood management during 2012-2013 in Angul district of mid central table land zone of Central Odisha. To determine the distribution of adoption of the technologies, a set of key factors was developed from the stratification and by classifying households. Survey questions were used to identify the reasons for household adoption and the reasons for the distribution of adoption of related technological interventions in the areas of study with respect to vegetable production and suitable methods of approach for transfer of technology under rainfed and irrigated areas to sustain a livelihood system specifying attributes of innovations were studied taking 240 respondents from 4 villages comprising both rainfed and irrigated situations. In looking at the differences between two situations (rainfed and irrigated) in adoption of vegetable technology, significant difference is observed in case of pesticide application (48.34%), fertilizer management (20.00%), post harvest care with storage facility(1334 % each).A comparative study to find the difference in technological interventions in both situations revealed soil fertility and market remain unaffected whereas sowing technique and fertilizer management are different.

KEYWORDS: Vegetable Cultivation, Technological Interventions, Adoption, Attributes of Innovation

INTRODUCTION

Odisha employs around 73% of its population in farming who contribute around 30% to the Net State Domestic Product. Of the total land area, around 40% that translates to roughly around 87.46 lakh hectares are brought to agriculture every year and about 18.79 lakh hectares of this cropped area is irrigated. Thus a major portion of the farm land depends on rain for water feeding the crop. During last 50 years India has a lot in terms of vegetable production but we are far lagging behind the food security index. India contributes about 13 per cent to the world vegetable production and occupies first position in the production of cauliflower, second in onion and third in cabbage in the world. Odisha is one of the states of India where vast potential exists for vegetable production with 10 agro climatic zones. Next to cereals, pulses, oilseeds, vegetable occupy an important position in the economy of Odisha's agriculture. According to The International Food Policy Research Institute (IFPRI), Washington, there is an urgent need to produce nutritious food in a sustainable manner and to improve farm family income in order to ensure household food security. The not so prominent status of vegetable production in food security context owes to the fact of partial or non-adoption of available technologies.

Specific Objectives

- To take stock of technological interventions in the areas of study with respect to vegetable production
- To determine the level and extent of adoption of selected agricultural technologies
- To ascertain suitable methods of approach for transfer of technology under rainfed and irrigated areas to sustain a livelihood System specifying attributes of innovations or technology

MATERIALS AND METHODOLOGY

Angul district of Odisha lies between 20° 31′ N & 21° 40′ N latitude and 84°15′ E & 85° 23′ E longitude. The total geographical area of Angul is 6232 sq.kms. Odisha state has 30 districts and Angul district was selected purposively as being in the mid-central table land zone it represents the overall livelihood system as it covers parameters like rural, semi-urban, rainfed, irrigated, agriculturally dominant and moving towards industrialization.The relevant secondary data has been collected from 2 blocks of the district selected purposively. From each block, 2 villages have been selected purposively as per diversification and livelihood strategies adopted for sustaining livelihood**.** Respondents were selected by simple random sampling with replacement. From each village, 60 households were selected taking 12 % of the population. A total of 240 respondents (Table 1) comprise the sample for study. The data collection was done with the help of a structured interview schedule, experts view and focused group discussion.

The entire study comprised of dependent and independent variables with good number of intervening variables.

RESULTS AND DISCUSSIONS

The horticulture sector includes a wide range of crops such as fruits, vegetables, roots and flowers, which cause diversification in agriculture. It has been recognized that growing vegetables is now an ideal option to improve livelihood security, enhance employment generation, attaining of food and nutritional security and increase income through value addition. Odisha grows a variety of vegetables in different season both in irrigated and rainfed area .Vegetable is taken as almost a cash crop for small and marginal farmers which fetch good price in market. Angul district has good potential for vegetable production. During Kharif, around 22,000 hectares are being covered under different kharif vegetables and during Rabi around 30,000 hectares are being covered with rabi vegetables. Technological interventions in vegetable cultivation are many and of different kinds. With due consideration with experts, progressive farmers and agriculture extension officers, relevant variables were selected such as soil fertility management, sowing technique, fertilizer management, need based pesticide application, storage, post harvest operations , value addition and market linkages.

These important parameters are constant in any state of the country concerned with vegetable production system. The soil fertility management has been operationalized and is defined in terms of acid or alkali and affecting texture and structure of soil whereas fertilizer application of macro or micro nutrient in terms of NPK as per requirement of crop per unit area.

Table 1: Sample Information

District	Blocks	Villages	Total Respondents
Angul	Chhendipada	Nuagaon Jaripal	60 60
	Atthamalik	Berham Mandarbahal	60 60

Table 2: Adoption of Technological Interventions in Vegetable Cultivation

Sl. No.	Interventions	Rain Fed				Irrigated				Difference in Adoption
		Adopters		Non-Adopters		Adopters		Non-Adopters		
		f	%	f	%	f	%	f	%	%
1.	Soil fertility management	53	44.16	67	55.84	49	40.84	71	59.16	3.32
2.	Sowing technique	64	53.33	56	46.67	70	58.33	40	33.33	5.00
3.	Fertilizer management	41	34.17	79	65.83	65	54.17	62	51.67	20.00
4.	Need based pesticide application	29	24.16	91	75.84	87	72.50	33	27.50	48.34
5.	Storage facility	20	16.67	100	83.33	36	30.00	82	70.00	13.33
6.	Post harvest operation	08	66.67	112	33.33	64	53.33	56	46.67	13.34
7.	Value addition	-	-	120	100.00	19	15.83	101	84.16	15.83
8.	Market linkage	11	9.17	109	8.33	28	23.33	92	76.67	14.16

N= 120 in each intervention in both the farming situations (i.e total 240)

Vegetable growers in the district have wide range of technology options.To standardize the vegetable technologies in a scale of different parameter, only five vegetables were selected as per maximum area coverage in the district. In case of rainfed area, adoption of appropriate post harvest care is 66.67% followed by sowing techniques (53.33%) soil fertility management (44.16%),pesticides application 24.16%) and storage facility (16.67%).

The innovation reaches to the small scale farmers in a very slow mode (Rogers, 1995) and Jalvi (1996) emphasized the need to carryout research on Agricultural Extension techniques throughout for the purpose of updating and modifying extension system on a regular basis for better adoption outcome.

On the other hand in irrigated villages need based fertilizer application tops the list followed by sowing technique, fertilizer management, post harvest care, storage facility and market linkage .However 15.83% apply value addition techniques to the surplus vegetables which is absent in rain fed area.

In looking at the differences between 2 situations in adoption of vegetable technology, significant difference is observed in case of pesticide application, fertilizer management ,post harvest care with storage facility. There is also difference in market linkage in both the situations.

Difference in Adoption of Interventions in Vegetable Cultivation

Vegetable cultivation is influenced by many factors out of which eight selected factors were examined through “z” test to find out difference between adopters of rainfed and irrigated areas remain same or differ significantly.

Table 3: Difference in Adoption of Interventions in Vegetable cultivation

Sl. No.	Intervention	Rain fed	Irrigated	"z" value
		Adoption %	Adoption %	
1.	Soil fertility Management	44.16	40.84	0.40 (NS)
2.	Sowing Technique	53.33	58.33	2.00 *
3.	Fertilizer management	34.17	54.17	2.00 *
4.	Need based pesticide application	24.16	72.50	5.00 **
5.	Storage facility	16.67	30.00	1.67 (NS)
6.	Post harvest operation	66.67	53.33	4.02 **
7.	Value addition	-	15.83	5.00 **
8.	Market linkages	9.17	23.33	1.70 (NS)

***Significant at 5% level of probability; ** Significant at 1% level of probability, NS – Non-significant**

A look at Table 3 reveals that soil fertility management ,storage facility and market linkages remain unaffected because of irrigation facilities whereas sowing techniques , fertilizer management ,post harvest care and value addition are different .It implies that irrigation made differences in those variable found to be significant whereas NS variables remain neutral.

Relation between Socio-Economic Status and Adoption of Technological Interventions

The socio-economic variable invariably influences adoption behaviour of the farmers. The research funding have clearly established that higher the SE status greater is the rate of adoption. In order to find out existing relationship between socio-economic status and adoption behaviour, with respect to technological interventions in six enterprises included in the study was analysed. The sample adopting particular technology was taken in to consideration leaving out non-adopters.

Table 4: Correlation Coefficient between Socio-Economic Condition and Adoption of Technological Interventions

Sl. No.	Enterprise	Rain fed Condition		Irrigated Condition	
		"z_r" value	"t" value	"z_r" value	"t" value
1.	Vegetable cultivation	0.203	2.23 *	0.590	8.75**

***Significant at 5% Level of Probability; ** Significant at 1 % level of probability, NS – Non-significant**

Analysis of above Table 4 reveals that considering vegetable cultivation, the high correlation is obtained in case of irrigated area whereas maintains low level of correlation ((t =2.23) in rainfed areas. In case of vegetable cultivation, significant correlation (t=8.75) is observed in irrigation condition because of presence of water bodies and almost independent in rain fed area because of unavailability of water resources.

To Ascertain Suitable Methods of Approach for Transfer of Technology under Rainfed and Irrigated Areas to Sustain a Livelihood System Specifying Attributes of Innovations or Technology

Adoption of an innovation according to a recent review of the adoption literature is principally influenced by the characteristics and circumstances of the farmer, and the characteristics of the practice, especially its relative advantage over existing practices and landholder's ability to trial the practice. Farmers adopt an innovation if they expect that the practice will help them achieve their goals, which may include economic, social and environmental goals.

Table 5: Stimulating Approach for Acceleration of Transfer of Technology (N =240)

Sl. No.	ENTERPRISES ⟶ APPROACHES▼	Vegetable Cultivation %
1.	Multichannel information	30.00
2.	Pro-poor approach	22.50
3.	Public sector financing	21.25
4.	Service provider	25.00
5.	Feedback system	32.91
6.	Poverty reduction	43.75
7.	Competitive market	83.75
8.	NRM/Environment security	25.42
9.	Farmers federation	87.08
10.	Vil. Extn woker/ para-extension worker	70.42

Vegetable Cultivation

The result above reveals that in case of adoption of vegetable technologies, farmers group or federation structure stand first (87.08%) followed by competitive market (83.75%), para extension workers, poverty reduction, feed-back system and multi-channel information. However performance of public sector financing, pro-poor approach didn't reflect much owing to reasons that credit is not much available for vegetable production and as farmer undertake small patches to satisfy household requirement with market surplus.

Coefficient Correlation of between enterprises and approaches

Relation between enterprises and adoption for which different approaches are employed explains the situation under which farmers can accept or reject an innovation.

Table 6: Vegetable Technologies and Stimulating Approach

Sl. No	Approaches	" z_r" value	"t" value
1.	Multichannel Information	0.330	3.27 (**)
2.	Pro-poor approach	0.283	2.58 (**)
3.	Public sector financing	0.394	3.48 (**)
4.	Service provider	0.652	10.1 (**)
5.	Feedback system	0.180	1.18 (NS)
6.	poverty reduction	0.512	8.16 (**)
7.	Competitive Market	0.884	10.8 (**)
8.	NRM/Environment Security	0.656	10.8 (**)

***Significant at 5% level of probability;**Significant at 1 % level of probability, NS – Non-significant**

In case of vegetable cultivation, study included as many as eight variables which signify different components of technology. In finding out the stimulating approach for adoption,market structure(t=10.8) stood first followed by service provider(t=10.1) owing to the dependence of farmers on seed and pesticide dealers. However the role of feedback was found to be negligible. The para-extension workers are also found to be an important factor for motivating farmers to adopt

technology of improved vegetable cultivation irrespective of area under irrigation.

Attributes of Innovation for Successful Adoption

Technology armed with certain useful attributes and useful to increase income of farmers has been focal point of adoption. Taking review of literature into consideration and experts in the field of transfer of technology, six important attributes of all the enterprises were taken in to consideration. These are relative advantage, affordability, social acceptability, timely availability, marketability and compatibility.

Table 7: Attributes of Innovation for Successful Adoption

Sl. No.	Enterprise	Vegetable Cultivation (n=95)	
	Attributes	M.S	Rank
1.	Relative Advantage	3.00	II
2.	Affordability	2.89	III
3.	Social Acceptability	2.79	V
4.	Timely Availability	3.21	I
5.	Marketability	2.81	IV
6.	Compatibility	3.00	II

M.S- Mean score

In case of vegetable cultivation, the luring factors of adoption remain with timely availability of input, relative advantage, compatibility and affordability followed by market demand and social acceptability.

CONCLUSIONS

This study examined the adoption status of technological interventions in rainfed and irrigated areas. The impact of improved vegetable production technology adoption on vegetable productivity and farming households' welfare in the study area using a cross sectional data of 240 farmers. Technology adoption concentrates on factors that influence adoption of modern technology in relation to traditional technology. The findings reveal that the extent of adoption is highest in nutrient management followed by variety replacement, SRI method and IPM in rain fed areas whereas in irrigated condition variety replacement tops the list followed by nutrient management, SRI method and IPM. Government should give due importance to these factors while strategic planning. Hence, efforts should be intensified to ensure farmers have access to adequate quality improved rice seed at the right time.

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